Cerro Coso College

Course Outline of Record Report

10/18/2021

MATHC255 : Ordinary Differential Equations

General Information

Author:	• Vivian Baker • Rogers, Steven
Course Code (CB01) :	MATHC255
Course Title (CB02) :	Ordinary Differential Equations
Department:	Mathematics
Proposal Start:	Spring 2019
TOP Code (CB03) :	(1701.00) Mathematics, General
SAM Code (CB09) :	Non-occupational
Distance Education Approved:	Yes
Course Control Number (CB00) :	CCC000226745
Curriculum Committee Approval Date:	10/20/2017
Board of Trustees Approval Date:	12/14/2017
External Review Approval Date:	Pending
Course Description:	This course provides students with a foundation of differential equations of change, motion, and growth within chemical, physical, biological, and business systems with problem solving and applications. Students are introduced to modeling using mathematical software used in industry to solve complex problems. First, second, and higher order differential equations including Euler''s Method, Eigenvalues, Numerical Methods, Nonlinear Systems, and La Place Transforms are covered. Advisory: A computer algebra system or graphing calculator and basic computer skills are strongly recommended.
Submission Type:	Change to Content Course is being updated to align program applicability with current programs, move current C-ID-defined SLO's to "Objectives," and add locally-determined SLO's
Author:	No value

Faculty Minimum Qualifications

Master Discipline Preferred:	• Mathematics
Alternate Master Discipline Preferred:	• Engineering • Physics/Astronomy
Bachelors or Associates Discipline Preferred:	No value
Additional Bachelors or Associates Discipline Preferred:	No value

Course Development Options

Basic Skills Status (CB08)	**Course Special Class Status (CB13)**	**Grade Options**

Course is not a basic skills course.

Course is not a special class.

- Letter Grade Methods
- Pass/No Pass

☐ Allow Students to Gain Credit by Exam/Challenge

Allowed Number of Retakes

0

Course Prior To College Level (CB21)

Not applicable.

Rationale For Credit By Exam/Challenge

No value

Retake Policy Description

Type:|Non-Repeatable Credit

☑ Allow Students To Audit Course

Course Support Course Status (CB26)

No value

Associated Programs

☑ Course is part of a program (CB24)

Associated Program	Award Type	Active
CC Liberal Arts: Mathematics & Science	A.A. Degree Major	Summer 2018 to Fall 2020
Associate in Science Degree In Mathematics for Transfer	A.A. Degree for Transfer	Summer 2018
CSU General Education (CSU GE Breadth) (In Development)	Certificate of Achievement	Fall 2021
Intersegmental General Education Transfer Curriculum Certificate of Achievement (In Development)	Certificate of Achievement	Fall 2021
CSU General Education (CSU GE Breadth)	Certificate of Achievement	Fall 2020
Intersegmental General Education Transfer Curriculum Certificate of Achievement	Certificate of Achievement	Fall 2020
Liberal Arts: Mathematics & Science Associate in Arts Degree	A.A. Degree Major	Fall 2020

Transferability & Gen. Ed. Options

Course General Education Status (CB25)

No value

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

Intersegmental General Education Transfer Curriculum	Categories	Status	Approval Date	Comparable Course
Area 2	Mathematical Concepts & Quantitative Reasoning	Approved	No value	No Comparable Course defined.

CSU General Education Certification	Categories	Status	Approval Date	Comparable Course
Area B.4	Scientific Inquiry & Quantitative Reasoning Mathematics / Quantitative Reasoning	Approved	No value	No Comparable Course defined.

Units and Hours

Summary

Minimum Credit Units (CB07)	4
Maximum Credit Units (CB06)	4
Total Course In-Class (Contact) Hours	72
Total Course Out-of-Class Hours	144
Total Student Learning Hours	216
Faculty Load	0

Credit / Non-Credit Options

Course Credit Status (CB04)

Credit - Degree Applicable

Course Non Credit Category (CB22)

Credit Course.

Non-Credit Characteristic

No Value

Course Classification Status (CB11)

Credit Course.

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

☐ Variable Credit Course

Weekly Student Hours

	In Class	Out of Classs
Lecture Hours	4	8

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54

Laboratory Hours	0	0
Activity Hours	0	0

Course In-Class (Contact) Hours	
Lecture	72
Laboratory	0
Activity	0
Total	72

Course Out-of-Class Hours	
Lecture	144
Laboratory	0
Activity	0
Total	144

Time Commitment Notes for Students

No value

Faculty Load

Extra Duties: 0

Faculty Load: 0

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Pre-requisites, Co-requisites, Anti-requisites and Advisories

Prerequisite

MATHC251 - Analytic Geometry and Calculus III

n Math C255 students are expected to consistently use the Cartesian, polar, cylindrical, and spherical coordinate systems effectively; use scalar and vector products in applications; use vector-valued products in applications; extend the concepts of derivatives, differentials, and integrals to include multiple independent variables; and solve simple differential equations of the first and second order. Students successfully demonstrating these Math C251 skills will be prepared for Math C255.

Entrance Skills

Entrance Skills	Description

No value	No value

Limitations on Enrollment

Limitations on Enrollment	Description
A computer algebra system or graphing calculator and basic computer skills are strongly recommended.	No Value

Specifications

Methods of Instruction

Methods of Instruction	Other
Rationale	Other Methods: A. lecture and discussion of all course concepts. B. demonstration of developing proofs and solving application problems. C. reading textbooks and journals to see presentations different than those of the instructor. D. assignments and quizzes E. the use of computational and other types of mathematical software
Methods of Instruction	Discussion
Rationale	No value
Methods of Instruction	Lecture
Rationale	No value
Methods of Instruction	Demonstration
Rationale	No value

Assignments

A. Reading assignments. B. Bi-weekly homework assignments to include assigned textbook problems. Sample homework problem,

Solve the initial value problem image , image

Methods of Evaluation	Rationale
Tests	A. tests on course content, to include solving equations as well as demonstration of specific skills B. quizzes (in-class and take-home) to include solving equations as well as demonstration of specific skills
Participation	C. group work to analyze and solve application problems

Equipment

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Howell	Ordinary Differential Equations: An Introduction to the Fundamentals	CRC Press	2015	

Other Instructional Materials

Description	Selected readings from mathematical journals (e.g., College Mathematics Journal), scientific journals (e.g., Scientific American, Science, and Nature), computer graphics/animation journals (e.g., Cadence) and books.
Author	No value
Citation	No value

Materials Fee

No

Learning Outcomes and Objectives

Course Objectives

Create and analyze mathematical models using ordinary differential equations.

Identify the type of a given differential equation and select and apply the appropriate analytical technique for finding the solution of first order and selected higher order ordinary differential equations.

Apply the existence and uniqueness theorems for ordinary differential equations.

Find power series solutions to ordinary differential equations.

Determine the Laplace Transform (LT) and inverse LT of functions and use the LT to solve linear differential equations.

Solve linear systems of ordinary differential equations using eigenvalue /eigenvector techniques.

CSLOs

Analyze a differential equation to determine an appropriate method of solution, and apply that method to determine the solution.
Expected SLO Performance: 70.0

Model several types of applications by formulating appropriate initial value problems.
Expected SLO Performance: 70.0

Represent a higher order linear differential equation as a first order linear system and, in simple cases, find all solutions to the system.
Expected SLO Performance: 70.0

Outline

Course Outline

The Mathematics Department has adopted the following best practices for teaching this course: offering or awarding extra-credit is forbidden, the allowance of multiple attempts at exams is forbidden, and an approved on-site proctor for online course exams is required.

A. Solutions of ordinary differential equations;

B. First order differential equations including separable, homogeneous, exact, and linear;
C. Existence and uniqueness of solutions;
D. Applications of first order differential equations such as circuits, mixture problems, population modeling, orthogonal trajectories, and slope fields;

E. Second order and higher order linear differential equations; variation of parameters and undetermined coefficients
F. Fundamental solutions, independence, Wronskian;
G. Nonhomogeneous equations;

H. Applications of higher order differential equations such as the harmonic oscillator and circuits;

I. Variation of parameters;
J. Laplace Transforms;
K. Series Solutions; and

L. Systems of Ordinary differential equations

Delivery Methods and Distance Education

Delivery Method: Please list all that apply -Face to face -Online (purely online no face-to-face contact) -Online with some required face-to-face meetings ("Hybrid") -Online course with on ground testing -iTV – Interactive video = Face to face course with significant required activities in a distance modality -Other

Online with some required face-to-face meetings ("Hybrid")
iTV – Interactive video = Face to face course with significant required activities in a distance modality
Online course with on ground testing
Face to face;

Rigor Statement: Assignments and evaluations should be of the same rigor as those used in the on-ground course. If they are not the same as those noted in the COR on the Methods of Evaluation and out-of-class assignments pages, indicate what the differences are and why they are being used. For instance, if labs, field trips, or site visits are required in the face to face section of this course, how will these requirements be met with the same rigor in the Distance Education section?

All assignments in distance education courses (online, hybrid and iTV) are the same as those in the on-ground course, except that students in purely online sections will submit all of their assignments virtually, and students in hybrid sections will submit some of their assignments virtually. Instructor evaluation of student work in distance education courses is the same as in the on-ground course, except that evaluation of student work in online and hybrid courses is presented virtually. Instead of onsite lectures, hybrid and online courses will use videos and written lecture notes.

As with any on-ground class, the instructor must provide substantive critiques of all submitted material and at least general responses to discussion posts. Instructor assigns the completion of math problems in a publisher site as an exercise including check figures and assistance when needed. The publisher's site will reinforce the course's SLO's.

Effective Student-Instructor Contact: Good practice requires both asynchronous and synchronous contact for effective contact. List the methods expected of all instructors teaching the course. -Learning Management System -Discussion Forums -Moodle Message -Other Contact -Chat/Instant Messaging -E-mail -Face-to-face meeting(s) -Newsgroup/Discussion Board -Proctored Exam -Telephone -iTV -Interactive Video -Other (specify)

forums
message
email
face2face
proctored

Software and Equipment: What additional software or hardware, if any, is required for this course purely because of its delivery mode? How is technical support to be provided?

No Value

Accessibility: Section 508 of the Rehabilitation Act requires access to the Federal government's electronic and information technology. The law covers all types of electronic and information technology in the Federal sector and is not limited to assistive technologies used by people with disabilities. It applies to all Federal agencies when they develop, procure, maintain, or use such technology. Federal agencies must ensure that this technology is accessible to employees and the public to the extent it does not pose an "undue burden". I am using -iTV—Interactive Video only -Learning management system -Publisher course with learning management system interface.

itv
LMS
publisher

Class Size: Good practice is that section size should be no greater in distance ed modes than in regular face-to-face versions of the course. Will the recommended section size be lower than in on-ground sections? If so, explain why.

class_size Hybrid 45